

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

PPKelly
Attn: Boyce, Conor
27 Clyde Road
Ballsbridge
Dublin 4
IRELAND

RECEIVED

27 APR 2010

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DATE: *B*

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year)

20/04/2010

Applicant's or agent's file reference

P94509PC00

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/EP2009/005461

International filing date
(day/month/year)

28/07/2009

Applicant

FOTONATION IRELAND LIMITED

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Fascimle No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of **18 months** from the priority date, the International application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until **30 months** from the priority date (in some Offices even later); otherwise, the applicant must, within **20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide, National Chapters*.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040
Fax: (+31-70) 340-3016

Authorized officer

Brigitte Chiarizia

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P94509PC00	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/EP2009/005461	International filing date (day/month/year) 28/07/2009	(Earliest) Priority Date (day/month/year) 30/07/2008
Applicant FOTONATION IRELAND LIMITED		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

- b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).
 c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
 b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2009/005461

A. CLASSIFICATION OF SUBJECT MATTER

INV. 606T5/00

ADD. 606K9/00 H04N5/232

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06T G06K H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	US 2002/081003 A1 (SOBOL ROBERT E [US]) 27 June 2002 (2002-06-27) cited in the application In particular paragraphs [0023] to [0041] -----	1-25
X	WO 00/76398 A1 (PROCTER & GAMBLE [US]) 21 December 2000 (2000-12-21) cited in the application In particular pages 7 to 15 -----	1-25
X	EP 1 453 002 A2 (EASTMAN KODAK CO [US]) 1 September 2004 (2004-09-01) In particular paragraphs [0034] to [0053] ----- -/-	1-25

☒ Further documents are listed in the continuation of Box C☒ See patent family annex.

* Special categories of cited documents

- *A* document defining the general state of the art which is not considered to be of particular relevance
 C earlier document but published on or after the international filing date
 I document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 O document referring to an oral disclosure, use, exhibition or other means
 P document published prior to the international filing date but later than the priority date claimed

- *I* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
 S document member of the same patent family

Date of the actual completion of the international search

29 March 2010

Date of mailing of the international search report

20/04/2010

Name and mailing address of the ISA/

European Patent Office, P.O. Box 5818 Patentplan 2
 NL - 2280 HW Rijswijk
 Tel (+31-70) 340-2040,
 Fax (+31-70) 340-3016

Authorized officer

Thean, Andrew

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2009/005461

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>Yao, Christina: "Image Cosmetics: An automatic Skin Exfoliation Framework on Static Images"</p> <p>UCSB Four Eyes Lab Imaging, Interaction, and Innovative Interfaces Publications Thesis, Master of Science in Media Arts and Technology</p> <p>December 2005 (2005-12), pages I-83, XP002575131</p> <p>University of California</p> <p>Retrieved from the Internet:</p> <p>URL: http://ilab.cs.ucsb.edu/publications/YaoMS.pdf</p> <p>[retrieved on 2010-03-25]</p> <p>In particular Chapters 6 and 7</p> <p>-----</p>	1-25
A	<p>EP 1 441 497 A2 (LAO SHIHONG)</p> <p>28 July 2004 (2004-07-28)</p> <p>In particular paragraphs [0128] to [0143]</p> <p>-----</p>	1-25
A	<p>US 2006/228037 A1 (SIMON RICHARD A [US] ET AL) 12 October 2006 (2006-10-12)</p> <p>cited in the application</p> <p>In particular paragraphs [0065] to [0080]</p> <p>-----</p>	1-25
A	<p>WO 2007/128117 A1 (AARABI PARHAM [CA]) 15 November 2007 (2007-11-15)</p> <p>the whole document</p> <p>-----</p>	1-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2009/005461

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 2002081003	A1	27-06-2002	DE	10164201	A1	25-07-2002
			GB	2372168	A	14-08-2002
WO 0076398	A1	21-12-2000	AU	5598000	A	02-01-2001
			BR	0012216	A	06-08-2002
			CN	1355680	A	26-06-2002
			CN	1781448	A	07-06-2006
			EP	1189536	A1	27-03-2002
			JP	2001000419	A	09-01-2001
			MX	PA01012946	A	30-07-2002
			US	6571003	B1	27-05-2003
EP 1453002	A2	01-09-2004	AU	2004200313	A1	16-09-2004
			CA	2455088	A1	28-08-2004
			CN	1525401	A	01-09-2004
			HK	1069242	A1	04-07-2008
			JP	2004265406	A	24-09-2004
			US	2006153470	A1	13-07-2006
			US	2004170337	A1	02-09-2004
EP 1441497	A2	28-07-2004	CN	1522052	A	18-08-2004
			JP	4218348	B2	04-02-2009
			JP	2004222118	A	05-08-2004
			US	2004208114	A1	21-10-2004
US 2006228037	A1	12-10-2006	US	2006228038	A1	12-10-2006
			US	2006228039	A1	12-10-2006
			US	2006228040	A1	12-10-2006
WO 2007128117	A1	15-11-2007	GB	2451050	A	14-01-2009
			US	2008267443	A1	30-10-2008

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION See paragraph 2 below

International application No
PCT/EP2009/005461

International filing date (day/month/year)
28.07.2009

Priority date (day/month/year)
30.07.2008

International Patent Classification (IPC) or both national classification and IPC

INV. G06T5/00

ADD. G06K9/00 H04N5/232

Applicant

FOTONATION IRELAND LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA



European Patent Office
P.B. 5818 Patentbus 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040
Fax: +31 70 340 - 3016

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Thean, Andrew

Telephone No. +31 70 340-4956



WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2009/005461

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
- a. (means)
 - ☐ on paper
 - ☐ in electronic form
 - b. (time)
 - ☐ in the international application as filed
 - ☐ together with the international application in electronic form
 - ☐ subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-16, 24, 25</u>
	No: Claims	<u>17-23</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-25</u>
Industrial applicability (IA)	Yes: Claims	<u>1-25</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement.

- 1 Reference is made to the following documents:
- D1 US 2002/081003 A1 (SOBOL ROBERT E [US]) 27 June 2002 cited in the application
- D2 WO 00/76398 A1 (PROCTER & GAMBLE [US]) 21 December 2000 cited in the application
- D3 EP 1 453 002 A2 (EASTMAN KODAK CO [US]) 1 September 2004
- D4 Yao, Christina: "Image Cosmetics: An automatic Skin Exfoliation Framework on Static Images" December 2005, Thesis, Master of Science in Media Arts and Technology, University of California , USA , XP002575131
- D5 EP 1 441 497 A2 (LAO SHIHONG) 28 July 2004
- D6 US 2006/228037 A1 (SIMON RICHARD A [US] ET AL) 12 October 2006 cited in the application

2 Article 6 PCT

- 2.1 Independent claims 1, 8, 24 and 25 are not clear (Article 6 PCT) because the meaning of the phrase '*vary in luminance at least a threshold amount*' is both unclear and unsupported by the description. The meaning of this phrase is vague and it does not appear to correspond to any features of the description, note that:
- There is no teaching of applying a '*threshold*' to the variance in luminance in the Description on pages 10 (lines 7 to 18) or pages 13 (lines 7 to 28);
 - The use of a '*threshold*' to filter data according to the Description on page 8 (line 1) involves 'luminance contrast' and the thresholds on pages 4 (line 7), 12 (line 2) and 15 (line 21) are not applied to luminance values;
 - Although the meaning of the Y component, defined in the context of the YCbCr and YUV colour spaces, is clear, in general, the term '*luminance*' refers to the luminous intensity of a surface in a given direction per unit of

projected area. Luminance is usually measured in candelas per square meter and can be defined for particular wavelength bands i.e. for different colours.

2.2 Independent claims 8, 24 and 25 are not clear (Article 6 PCT) for the following reasons:

- 2.3
- the term '*relatively low resolution*' is vague and has no accepted meaning in the relevant art;
 - the relationship between the '*main*' and the '*low resolution*' images is unclear from the wording of claim 8, in particular the unclear phrase '*including capturing [...] combination thereof*' defines a relationship in terms of temporal (*following capture*) and structural (*lens and image sensor*) features that are broad in meaning and whose significance is uncertain;
 - the phrase '*that correspond to*' is vague and unsupported by any features of the description. The association of '*blemish regions*' detected in one (set of) images to the same region in another '*main*' image may not be trivial in general because the '*main*' image may be taken under different imaging conditions (camera position and pose, lighting, etc) and at very different times; in general the '*main*' image may not contain the same subject as the '*low resolution*' images. It is unclear in which way the regions '*correspond to*' each other i.e. whether they are related by spatial position, shape, colour or some other property. Note that in the Description on page 10 (lines 26 to 30) facial enhancements may be based on an analysis of '*face region metadata determined from the real-time face tracking subsystem*': there is no disclosure of said real-time face tracking subsystem being adapted to identify blemishes in addition to faces and no explanation of how blemishes identified at low resolution may be associated with '*corresponding*' regions of the main image.

2.4 Dependent claims 6, 15 and 22 are unclear because the meaning of "*functions of a relationship*" is vague; it is not certain which part of the description is meant to support these claims.

3 **Article 33(3) PCT and independent claims 1, 8, 24 and 25**

3.1 The present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of independent claims 1, 8, 24 and 25 does not involve an inventive step.

- 3.2 D1, as cited by the applicant (see Description, page 2, line 23 to page 3, line 3), may be considered the closest prior art to claims 1, 8, 24 and 25 (see also Section 3.9). D1 discloses an image enhancing system that can be used with digital cameras (D1, paragraphs [0002] to [0009]) which "utilizes the results of the face detector to identify data defining certain personal features that can be enhanced by the image enhancer" (D1, paragraph [0027]) and which is configured to "automatically detect the aforementioned wrinkles and to automatically blur the pixel color values defining the wrinkles and the surrounding skin" (D1, paragraph [0028]). D1 teaches identifying wrinkles using pixel location (D1, paragraph [0028]) and locating other facial features "(e.g. skin, nose, mouth, eyes, etc.)" using their "expected shape and/or color" (D1, paragraph [0030]). Further, it teaches shading the skin tone with a method that uses colour-based skin detection (D1, paragraph [0029]).
- 3.3 In so far as it can be understood, given the lack of clarity outlined above, the subject matter of independent claims 1, 8, 24 and 25 differs from that of D1 in the following respect (see below for additional discussion of claim 8):
- according to claim 1 (and claims 8, 24 and 25), blemish regions are identified *'within the skin tone portions of the face'*. D1 teaches the importance of limiting facial feature detection to the facial region (D1, paragraph [0031]), but does not use skin tone portions of the face to limit the search for blemishes (D1 teaches the use of skin tone segmentation in the context of skin tone changing). D1 teaches using *a priori* geometrical assumptions ("corners of the person's eyes", D1, paragraph [0028]) to identify wrinkles and automatically detecting "*facial blemishes (e.g. pimples)*" using unspecified means (D1, paragraph [0040]).
- 3.4 The problem to be solved by the claimed invention may be regarded as:
- increasing the accuracy of automatic skin blemish identification by reducing the number of false positive detections (i.e. erroneous detections of regions not associated with skin blemishes).
- 3.5 The solution proposed in claimed in independent claims 1, 8, 24 and 25 cannot be considered to involve an inventive step (Article 33 (3) PCT) because it is a straightforward alternative that is well-established in the art of automatic blemish removal. See for example D2 (page 9, lines 20 to 22), D3 (paragraphs [0034] and [0044]) and D4 (Section 7.4).

3.6 Note the following:

- segmenting skin tone portions of an image forms the basis of some commonly-used face detection algorithms and would therefore be an implicit feature of some embodiments that a person skilled in the art would consider when implementing the invention taught in D1; see for example D2 (page 9, lines 20 to 22) where reference is made to "M.H. Yang, N. Ahuja, 'Detecting Human Faces in Color Images'". D5, paragraph [0004];
- since "*facial blemishes (e.g. pimples)*" (D1, paragraph [0040]) cannot be reliably identified using geometrical assumptions, a person skilled in the art contemplating D1 would be prompted to consider other methods of blemish identification (including those taught in D2 to D5);
- it is unclear which method of detecting blemishes is claimed in the independent claims (see Article 6 PCT discussion above). Note that the use of image texture and pixel intensity variance for identifying facial skin blemishes is one of several straightforward alternatives that are known in the art of automatic blemish removal; see D2 (page 12, line 26 to page 13, line 5) and D3 (paragraph [0072]);
- the generally-accepted meaning of the term '*luminance*' (see Article 6 PCT discussion above) includes the use of pixel colour i.e. the luminance in given colour bands as used in D1. The use of blemish reduction techniques that apply smoothing to a weighted combination of RGB values (e.g. Y in the YCbCr and YUV colour spaces) instead of RGB values would not involve an inventive step, because the use of such alternative colour spaces for such purposes is a straightforward alternative; see D3 (paragraphs [0046], [0054] and [0034]) and D6 (paragraph [0081]).

3.7 Regarding claim 8 (and claims 24 and 25), the subject matter of these claims is unclear (see Article 6 PCT objection above) and since no clear objective technical problem can be established, no inventive step can be attributed to the claimed invention (Article 33(3) PCT; see PCT Guidelines, A13.08.1).

3.8 Note the following:

- D1 teaches using scaled (resized, lower-resolution) images for improving the completeness of face detection (D1, paragraphs [0034] to [0036]);

- identifying blemish regions in images with lower-resolution than the main image has the predictable disadvantage that blemishes characterised by high-detail, high spatial-frequency features may be impossible to detect resulting in a higher rate of false negative blemish detection errors;
 - in as far as it can be understood, the use of lower-resolution images does not appear to combine with the disclosed method of blemish detection to produce a synergistic effect i.e. claim 8 appears to contain a juxtaposition of features;
 - blemish correction on main images using parameters derived from preview images is known to have advantages for digital camera systems e.g. see D5 paragraphs [0089] to [0093] and [0129] to [0138].
- 3.9 Claims 1, 8, 24 and 25 are not considered to involve an inventive step (Article 33(3) PCT) when documents D2 and D3 are taken as the closest prior art.
- 4 **Article 33(2) PCT and independent claim 17 and dependent claims 18 to 23**
- 4.1 Independent claim 17 and dependent claims 18 to 23 are not new (Article 33 (2) PCT) in view of D1 (localized smoothing is taught on paragraph [0028]; identification and enhancement of mouths and eyes is taught on paragraphs [0030] and [0031]). The meaning of the term 'luminance' has been discussed above.
- 5 **Article 33(3) PCT and remaining dependent claims**
- 5.1 Dependent claims 2 to 7 and 10 to 16 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT).
- 5.2 Regarding claims 2 to 4 (and claims 10 to 13), see D1, paragraph [0028].
- 5.3 Regarding claims 5 and 7 (and claims 14, 16), see "locate data defining a particular facial feature [...] manipulated to enhance the person's appearance" (D1, paragraph [0030]) and "search for white color values to locate the data defining a person's eyes" (D1, paragraph [0031]). See also, D3 (paragraphs [0083] to [0086]).
- 5.4 Regarding claim 6 (and claim 15), in so far as it can be understood, see D3 [0051], [0077] and [0079].
- 5.5 Regarding claim 9, in so far as it can be understood, see D5 paragraph [0135].